

Claims

1-12. (canceled)

13. (original) An apparatus comprising:

an elongated nozzle having an elongated opening defined along its length by a flexible back seal and a metering surface defined with respect to an upward direction of travel of a substrate or roll past the elongated opening, the substrate or roll having a width, the direction of travel such that the substrate or roll first encounters the flexible back seal and later encounters the metering surface, the elongated opening having first and second ends separated by a distance, the distance less than the width of the substrate or roll; the nozzle defining a back direction away from the substrate or roll and a front direction toward the substrate or roll;

a first end seal at the first end;

a second end seal at the second end;

the first seal comprising first, second, and third lips each extending in the direction of travel and each having an edge in the direction of the substrate or roll;

the second seal comprising first, second, and third lips each extending in the direction of travel and each having an edge in the direction of the substrate or roll;

the first lips of the first and second seals disposed toward each other;

the third lips of the first and second seals disposed away from each other;

the second lip of the first seal disposed between the first and third lips of the first seal;

the second lip of the second seal disposed between the first and third lips of the second seal;

the first and third lips of the first seal joined together at top ends thereof;

the first and third lips of the second seal joined together at top ends thereof;

the edges of the first and third lips of the first and second seals shaped to fit the substrate or roll.

14. (original) The apparatus of claim 13 wherein each lip has a portion having a radius of curvature about a respective center;

the center of radius of curvature of the second lip is offset from the center of radius of curvature of the first lip; and

the center of radius of curvature of the second lip is offset from the center of radius of curvature of the third lip.

15. (original) The end seal of claim 13 wherein each lip has a portion having a radius of curvature about a respective center; and

wherein the center of radius of curvature of the first lip is coaxial with the center of radius of curvature of the third lip.

16. (original) The apparatus of claim 13 wherein:

the first end seal is mounted to the nozzle by means of a flexible bracket; and
the second end seal is mounted to the nozzle by means of a flexible bracket.

17. (original) The apparatus of claim 13 further comprising coating fluid under a first pressure through the nozzle toward the substrate or roll;

the shape of the first end seal chosen to give rise to a second pressure of the coating fluid within a pocket defined by the first and third lips of the first seal, the second pressure less than the first pressure;

the shape of the second end seal chosen to give rise to a third pressure of the coating fluid within a pocket defined by the first and third lips of the second seal, the third pressure less than the first pressure.

18. (original) The apparatus of claim 13 further comprising a drip pan positioned below the first end seal and below the second end seal.

19. (original) An apparatus comprising:

an elongated nozzle having an elongated opening defined along its length by a flexible back seal and a metering surface defined with respect to an upward direction of travel of a substrate or roll past the elongated opening, the substrate or roll having a width, the direction of travel such that the substrate or roll first encounters the flexible back seal and later encounters the metering surface, the elongated opening having first and second ends separated by a distance, the distance less than the width of the substrate or roll; the nozzle defining a back direction away from the substrate or roll and a front direction toward the substrate or roll;

a first end seal at the first end;

a second end seal at the second end;

the first seal comprising first, second, and third lips each extending in the direction of travel and each having an edge in the direction of the substrate or

roll;

the second seal comprising first, second, and third lips each extending in the direction of travel and each having an edge in the direction of the substrate or roll;

the first lips of the first and second seals disposed toward each other;

the third lips of the first and second seals disposed away from each other;

the first and third lips of the first seal joined together at top ends thereof;

the first and third lips of the second seal joined together at top ends thereof;

the second lip of the first seal disposed between the first and third lips thereof;

the second lip of the second seal disposed between the first and third lips thereof;

the edges of the first and third lips of the first and second seals shaped to fit the substrate or roll;

the first end seal mounted to the nozzle by means of a flexible bracket; and

the second end seal mounted to the nozzle by means of a flexible bracket.

20. (original) The apparatus of claim 19 further comprising a drip pan positioned below the first end seal and below the second end seal.

21. (original) The apparatus of claim 19 wherein each lip has a portion having a radius of curvature about a respective center;

the center of radius of curvature of the second lip is offset from the center of radius of curvature of the first lip; and

the center of radius of curvature of the second lip is offset from the center of radius of curvature of the third lip.

22. (original) The apparatus of claim 19 wherein each lip has a portion having a radius of curvature about a respective center; and

wherein the center of radius of curvature of the first lip is coaxial with the center of radius of curvature of the third lip.

23-25. (canceled)

26. (currently amended) ~~The apparatus of claim 23~~ Apparatus comprising a first nozzle and a return funnel, the apparatus positioning the first nozzle and the return funnel relative to an applicator roll or web,

the first nozzle comprising a slot elongated along a first axis, the slot defined by a flexible back seal elongated along the first axis and by a metering surface elongated along the first axis, the back seal and metering surface defining a first plane parallel with the first axis;

the slot disposed in osculation with the applicator roll or web along a line;

the apparatus comprising means by which the first nozzle may be fixed at any of a plurality of orientations so that the first plane is at any of a plurality of respective angles of rotation about the first axis.

wherein the apparatus comprises means causing

the return funnel to follow the ~~slot~~ respective angle of rotation about the first axis.

27. (original) An apparatus comprising:

an elongated nozzle having an elongated opening defined along its length by a flexible back seal and a metering surface defined with respect to an upward direction of travel of a substrate or roll past the elongated opening, the substrate or roll having a width, the direction of travel such that the substrate or roll first encounters the flexible back seal and later encounters the metering surface, the elongated opening having first and second ends separated by a distance, the distance less than the width of the substrate or roll; the nozzle defining a back direction away from the substrate or roll and a front direction toward the substrate or roll;

a first end seal at the first end;

a second end seal at the second end;

the first seal comprising a first lip extending in the direction of travel having an edge in the direction of the substrate or roll and having a first end toward the back seal and a second end toward the metering surface;

the second seal comprising a first lip extending in the direction of travel having an edge in the direction of the substrate or roll and having a first end toward the back seal and a second end toward the metering surface;

the edge of the first lip of the first and second seals shaped to fit the substrate or roll;

the first end seal pivotable about a first pivot point between first end and the second end thereof;

the second end seal pivotable about a second pivot point between first end and the second end thereof;

the first pivot point and the second pivot point each biased in the front direction.

28. (original) The apparatus of claim 27 further comprising a drip pan positioned below the first end seal and below the second end seal.

29. (original) The apparatus of claim 27 further comprising a first spring urging the second end of the first lip in the front direction, and a second spring urging the second end of the second lip in the front direction.

30. (original) The apparatus of claim 27 wherein the nozzle is rotatable about an axis parallel to the elongated opening, the apparatus comprising means by which the nozzle may be fixed at any of a plurality of respective angles of rotation about the first axis.

31-43. (canceled)

44. (currently amended) ~~The apparatus of claim 43 further comprising~~ An apparatus comprising:

one or more elongated nozzles consisting of a leading edge, a metering surface and end seals having an elongated opening that deposits coating to an application surface;

a return trough for the active nozzle to collect undeposited coating back for recycling;

a return funnel for collecting undeposited coating from the return trough for return to the coating tank for recycling; and

a locking system that provides direct and consistent locking of the return funnel to the return trough orientation for operating conditions.

45. (currently amended) ~~The apparatus of claim 44 further comprising~~ An apparatus comprising:

one or more elongated nozzles consisting of a leading edge, a metering surface and end seals having an elongated opening that deposits coating to an application surface;

a return trough for the active nozzle to collect undeposited coating back for recycling;

a return funnel for collecting undeposited coating from the return trough for return to the coating tank for recycling; and

a system for opening the return funnels away from the nozzles and return trough to permit clearance for rotation of the nozzle or nozzles for cleaning or to use an alternate nozzle configuration.

46. (currently amended) ~~The apparatus of claim 45 further comprising~~ An apparatus comprising:

one or more elongated nozzles consisting of a leading edge, a metering surface and end seals having an elongated opening that deposits coating to an application surface;

a return trough for the active nozzle to collect undeposited coating back for recycling;

a return funnel for collecting undeposited coating from the return trough for return to the coating tank for recycling; and

a system for holding the return funnels into proper production orientation while the return funnels are open and the nozzles are being rotated for cleaning or to use an alternate nozzle configuration.

47. (canceled)